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...THE...

AMERICAN FERTILIZER

"That man is a benefactor to his race who makes two blades of grass to grow where but one grew before."

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The Agricultural Goals—Our Means of Reaching Them

By H. R. TOLLEY

Assistant Administrator, Office of Price Administration

THE World War gave American agriculture an unhealthy boom that lasted from 1916 to 1921, a period of five years. Our agriculture had not recovered fully from the dislocations of that war and that boom when the Japs attacked Pearl Harbor. It would be presumptuous for me to attempt to tell you members of the fertilizer industry about the disruptive effects that followed that boom two decades ago. I am aware that those effects are impressed upon your memories in red figures that neither you nor your stockholders will soon forget.

Nor need I tell you that the fertilizer industry and agriculture are so interdependent that conditions affecting one are almost immediately reflected in the other. The welfare of one quite naturally becomes the welfare of the other. In fact, the peculiar problems as well as the importance of the fertilizer industry are based upon the primary circumstance that it has only one customer—the farmer. So, when the Department of Agriculture announces production goals for farmers, you know your own production goals have been affected. The agricultural goals become, in great part, your goals, and you become vitally interested in the nature of those goals and in what the shifts in farm production will mean in terms of total fertilizer output.

The revised production goals announced by the Department of Agriculture early in February, then, will warrant some study from the standpoint of what they show as regards fertilizer requirements. These goals called for a total farm production this year 19 per cent greater than the average production in the years 1935–39, and 5 per cent greater than the all-time record high production of last year. When you recall that those years, 1935–39, were years of large production, you begin to see the magnitude of the production job the Nation's farmers are undertaking this year. Moreover, from the best information now available it appears that those goals in general will be met. The Nation's farmers may fall short on a few items, but they will be over on others.

The goal for peanuts, for example, now much needed as a source of oil, was set at 255 per cent of last year's production. That tremendous increase may not be reached, but I think you will agree that this goal really gave farmers something to shoot at. This becomes particularly apparent when you realize that the peanut acreage must compete with other oil-bearing crops for which increased acreages were asked. The milk goal, too, may not be reached, but when you consider that most of the increase has to come from increased feeding of the dairy herds we already had, it is not surprising that an increase of 8,000 million pounds may not be attained this year despite increased use of superphosphate on pastures. What is surprising is the over-shooting in other goals. The Department asked for a total production of 4,200 million dozen eggs. We'll get them—and more. The Department asked for more than a 3-million-acre increase in soybeans, 54 per cent greater than last year's acreage. We'll get it—and more.

In short, the farmer apparently is convinced, as he should be, that total war means

total farm production, and he's going out to get it. He knows that there is plenty of truth in the slogan which the Department of Agriculture took up even before Pearl Harbor—that "Food Will Win the War and Write the Peace." As a result, his immediate concern has become one of finding answers to the corollary questions, "What sort of food?" and —recalling memories of the last war—"What sort of peace?"

These are both valid questions, and the fertilizer manufacturer as well as the farmer might very profitably be thinking about the answers. It doesn't take much thinking on the part of anyone who has followed the history of American agriculture in the last 25 years to make one aware that those questions are definitely interrelated. To me they are as definitely related as the two cryptic lines engraved on the pedestals of the two seated figures guarding the entrance to the National Archives Building in Washington: On the base of the one is inscribed "What is Past is Prologue" and on the base of the other the almost terrifying injunction "Study the Past."

The farmers have studied that past as reflected in the last war and the peace that followed it. You fertilizer manufacturers have studied it. The Department of Agriculture has studied it. The Office of Price Administration has studied it. And the conclusion of all of us, I am sure, is that the sort of production planning we undertake—or fail to undertake—now in the midst of war will have a very definite bearing on the sort of peace we'll have to enjoy—or fail to enjoy—when the war is over.

Production Problems in 1943

What meaning this conclusion may have for the fertilizer industry is something I'll go into in a moment. For a minute more I'd like to take up the farmer's production problems, particularly as they are likely to come up in 1943.

Here, of course, we are on less certain ground than in estimating probable production this year, but I think that we may conclude that the general aims and policies announced by the Department of Agriculture this year will be continued. As in 1942, the Nation will need all possible production. Production increases, however, will be harder to get, and I doubt that we can expect more than a 4 or 5 per cent increase over production this year.

The factors limiting production are already becoming serious problems, and they will become even more serious as we bend our efforts more completely to all-out warfare: The labor, materials, and transportation needed for total farm production in many cases will have to yield priority to the labor, materials, and transportation needed more directly for carrying on total war. For example, your own ammonia liquors already have been diverted from agriculture to munitions. We are hoping that we will be able to replace diverted nitrogen through increased importations and through diversion of any surplus feed organics into fertilizer, but in the meantime the situation may become even more serious than at present.

Be that as it may, the emphasis in agriculture will be on a continuation of the shifts in production begun on such a huge scale this year: More pork, eggs, milk and milk products—more of the fats and oils and proteins which are essential if we are going to produce food in its more concentrated forms.

That will mean more feed supplies if we can possibly find the acreage for them, since they are a requisite to concentrated high-protein production. Livestock production already this year has cut into our reserve supplies of feed, and will cut more deeply next year unless we can step-up production. We are fortunate in that large reserves of grain are still available, but even here we can't afford to be optimistic. It is estimated that from 100 to 150 million bushels of grain will be needed next year for the production of industrial alcohol for non-feed uses, which will lessen the total supply of grain available for livestock feeding. This means that more than ever in 1943 we will have to emphasize the full use of all our facilities for farm production. That means efficient farming, and that means fertilizer. To ignore these meanings would be to ignore one of the first principles of all-out prosecution of the war on the farm front.

The Fertilizer Ratio Problem

Now what is the significance of this as regards the fertilizer industry? You already realize, I am sure, that the ratios of fertilizer utilization among crops may have to be altered, just as farmers have had to alter the ratio of the acreages planted to their various crops.

Fortunately, in the case of the farmers, these shifts in production are quite in line with what the farmer has learned by studying the past. By means of these shifts all-out farm production for this war can become a prologue to a better agricultural peace than that which followed the production efforts of the last war. I believe the same thing is true

of the fertilizer industry. If it *is* true, your cue certainly is not to fight the changes but to welcome them.

That's easy to say, of course, from a speaker's platform, but I am quite serious about it. I realize that you are going to have a difficult time securing needed materials, finding substitutes for those you can't get and fitting them into your manufacturing program at costs that will allow you to continue to operate. I realize, too, that all this will have to be done under price ceilings that are already putting some of you in an uncomfortable squeeze position, mainly because of the elimination of coastal shipping and the changeover to all-rail shipments. This, together with increased costs of certain materials and increases in labor costs, places some of you (particularly the northern operators with long freight hauls) at a distinct disadvantage.

Unless your operations are large enough so that you can average out your costs among regions where the increase has not been so severe, it is likely that some volume of actual production will appear to be threatened. It likely will be threatened unless you make plans, as the farmer has already done, to adapt your production to the new sort of war we are now engaged in.

As in the case of the farmer, these adaptations required by wartime transportation shortages can become the prologue to a more efficient peace-time distribution. There is little real reason, for instance, why fertilizer can't be sold to the farmer in more concentrated form. We continue to sell it as we do largely because farmers have always bought it that way. In wartime, however, that's not a sufficient answer against change—not when transportation facilities are as short as they are. The degree to which you can bring about such a change will be in part the degree to which you can meet at least one of the problems you face. Such a program will require acquainting the farmer with the proper handling and use of fertilizer concentrates, but I think you'll agree that it is eventually cheaper to deliver this type of information than to transport tons and tons of inert filler year after year, to the benefit of no one.

Farmers realize that fertilizer is essential to the profitable production of many crops—they must have required quantities or the agricultural production goals will be threatened. They will not be slow to learn that that means both efficient delivery on the part of the manufacturer and efficient use on the part of themselves. The Office of Price Administration likewise realizes that it must be prepared to handle efficiently the problems threatening to delay production or delivery of fertilizers when and as those problems arise —not afterwards. Fertilizing and planting time can't be delayed; the seasons won't wait while we undertake cost studies, economic analyses, and legal definitions that are completely understandable.

War Problems Bring Peace Benefits

Fortunately there are a number of considerations that should make all of us willing to tackle these wartime problems. For one thing, as I have already indicated, the solution to these problems will constitute an excellent prologue to peace. The efficiencies that are requisite to total war are just as requisite to total peace—and by that I mean a peace which isn't marred by the perennial depressions from which we have always suffered in the past. These depressions are no more necessary than war is necessary, but their avoidance in the future will require the same totality of effort toward peace that we are now bending toward war. We've got to be thinking about that—that's one consideration, a major one, which should incline us toward meeting these wartime problems head on without too much griping about how we're being mistreated by this government office or that government board.

For another thing, some of you foresaw the rising trend in fertilizer costs and were prepared to meet it. To that extent you were ready for the ceilings when they came. But even if your preparations weren't adequate from the standpoint of profits as usual—or losses as usual—you now know definitely what you are up against. To me the price-ceilings present that sort of challenge. It's the sort of challenge we accepted at Pearl Harbor. We knew after Pearl Harbor what sort of war effort we had to prepare for. Similarly, with the price-ceilings in effect we know quite definitely what sort of price-problems we will have to meet.

All of us, of course, accustomed as we have been to the ways of peace, would much prefer to work as we did before the event at Pearl Harbor upset the economic applecart and started the price-apples rolling toward inflation. For our part, even now the OPA would like to be able to sit in conference with you, and, starting with production of raw materials work through to an equitable arrangement all around on just what retail prices should prevail for each area. But that is now impossible—the retail ceilings are definitely set and they are with us for the dura-

tion. Accepting that fact, we will have to start working back from that retail price-level, rolling costs back as much as possible wherever we can.

In this connection, a recent study by the Bureau of Labor Statistics is of interest. This study—released last Monday—shows that after 19 months of increase, the cost of living in large cities declined during the period, May 15th to June 2nd. A net advance of 0.8 per cent in total living costs between mid-April and mid-May of this year changed to a decline of 0.1 per cent between mid-May and the beginning of June. That to me is a fairly good demonstration that the ceilings not only *can* work—they are actually working. It now becomes our purpose to keep them working with as little friction as possible.

In order to do this, it is obvious that economies in operations will have to be worked out wherever such economies are possible. In the past, competition has prevented you from effecting certain needed economies with which you are all familiar. Standardization of grades and packaging is a good example. Wartime conditions are likely to require this type of economy just as they are likely to require the economies in transportation I mentioned a moment ago and which I'd like to elaborate on somewhat further now.

The "Filler" Problem

Available statistics show that the average shipment of fertilizer to the farmer is hailed a little more than 100 miles and that the average outgoing car contains about 25 tons of mixed goods. If the inert material were eliminated except for small amounts to "balance-out" grades, the annual transportation saving on box-car shipments alone would be equivalent to from one to two million box-car miles. This is on the basis that box-car shipments of finished goods comprise only about 40 per cent of the total. The savings in rubber and gasoline on the shipments by truck—whether achieved through lighter loads or fewer loads—would be in addition to this.

Savings would also be effected on incoming shipments of filler. There it is estimated that, if inert materials were eliminated, the transportation relief afforded would equal about 20,000 hopper cars moving an average of 10 miles and loaded with 50 tons each.

The savings in packaging would be equally impressive. Various sized bags are used for marketing fertilizer. The most common size in the southeast where the highest proportions of filler are used is 200 pounds. A simple calculation shows that it requires 5,000,000 such bags to hold only 500,000 tons of filler.

No one questions that it is good economy on the part of the farmer to buy only such grades and strengths of fertilizer as will virtually eliminate all filler. With the situation that faces us today, this type of economy becomes almost imperative. This is true both because of the overburdening of our transportation system by wartime conditions and because of the grave necessity to conserve all materials and labor for total war.

The Use of High Analysis Fertilizers

There are a number of approaches that might be used either singly or in combination in promoting the use of higher analysis fertilizer. I shall mention three:

1. A general educational appeal.

2. Voluntary agreement among manufacturers not to produce fertilizer below a certain minimum plantfood content.

3. Government regulation.

We might depend entirely upon educational appeal and seek to meet the problem in that way. This is the approach that has been primarily used up to this time. That it has not been entirely ineffective is attested by the fact that the average plantfood content in mixed fertilizer has gradually increased over a period of years. It has increased, for example, from an average of 13.9 per cent in 1920 to 19.5 per cent in 1940. In certain sections of the country, notably in some of the New England States, the average plantfood content is already as high as 30 per cent.

But all of this increase cannot be attributed to educational appeal alone; a part of it, no doubt, has been due to the pressure of economic forces, such as changes in transportation costs and in processing techniques; and a part to the fact that raw materials of higher plantfood content have become available. Another important factor has been direct regulation by the States. Such increases that have taken place, furthermore, have come about rather slowly. This suggests that in an emergency such as we now find ourselves we should not rely upon education alone to get results. We must have procedures that are more direct and positive. This is not to say that the educational appeal should be minimized or discontinued. It means rather that it should be intensified and supplemented by other methods.

The second approach is similar to the first, except that instead of depending entirely upon farmer insistence, manufacturers them-

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Analysis of the Production of Ordinary Superphosphate in the United States in the Calendar Years 1940 and 1941

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(Continued from the August 15th issue)

Production of Superphosphate with Sulphuric Acid from Various Sources

AS SHOWN in Table 16, the 1940 production of superphosphate by all plants having coexisting acid-making facilities amounted to 3,191,719 tons or 70.5 per cent of the total domestic production; the corresponding figure for 1941 is 3,475,172 tons or 68.7 per cent. For such plants the average output per plant was 43,131 tons in 1940 and 45,132 tons in 1941, as compared to averages of only 18,818 and 22,580 tons, respectively, for plants that did not have acid-making facilities. The total output from plants having acid-making facilities increased 8.8 per cent in 1941 over 1940, as compared to an increase of 18.3 per cent for plants not having such facilities. A considerable number of plants that have acid-making facilities also use clear and spent acids from other sources; the total production of superphosphate by such plants amounted to 977,506 tons in 1940 and 1,013,731 tons in 1941. Thus, the output of superphosphate from plants that were entirely independent of outside sources (including all spent acid, whether the corresponding clear acid was or was not produced in the coexisting plant) for supplies of sulphuric acid amounted to 2,214,213 and 2,461,441 tons in 1940 and 1941, respectively.

The portion of the regional output of superphosphate produced by plants having acid-making facilities was highest (88.3 and 84.9 per cent in 1940 and 1941, respectively) in the Middle Atlantic States and lowest (38.4 and 36.4 per cent) in the Midwest. The availability of large quantities of byproduct acid fron zinc smelters and of primary acid from chemical companies is chiefly responsible for the low figures for the Midwest. In 1941, the plants in the South produced 52.7 per cent of the entire domestic output of superphosphate, as well as 52.7 per cent of

Table 16

Production of Ordinary Superphosphate by Plants Respectively Having and Not Having Acid-making Facilities, Calendar Years 1940 and 1941

(Includes all grades of ordinary superphosphate and wet-mixed base, expressed as equivalent 16 per cent superphosphate.)

	Production of superphosphate by plants—							
	Having coexisting acid-making facilities[1]				Not having coexisting acid-making facilities			
Region	Plants		Quantity		Plants		Quantity	
	1940 Number	1941 Number	1940 Short tons	1941 Short tons	1940 Number	1941 Number	1940 Short tons	1941 Short tons
New England[2]..	..	..	....	....	..	..	....	....
Middle Atlantic.	[3]9	[3]9	1,255,005	1,248,999	6	6	167,035	221,698
Southern.......	54	57	1,558.464	1,832,299	[4]43	42	709,343	833,672
Midwest[5].......	7	7	266,226	271,780	19	19	427,924	473,969
Undistributed[6]..	4	4	112,024	122,024	3	3	31,793	51,226
United States...	[3]74	[3]77	3,191,719	3,475,172	[4]71	70	1,336,095	1,580,565

[1] Including the entire production of plants that not only make acid but also purchase a portion of their requirements for superphosphate manufacture. The output of such plants in the Middle Atlantic, Southern, and Midwest regions and in the undistributed States was equivalent to 704,792, 637,214; 226,133, 322,977; 21,951, 21,885; and 24,630, 31,655 short tons of 16 per cent superphosphate in 1940 and 1941, respectively.
[2] Included with undistributed States.
[3] Including 1 plant that ceased operation in 1941.
[4] Including 1 plant that ceased operation in 1940.
[5] Except Michigan, which is included with undistributed States.
[6] California, Michigan, and New England States (Massachusetts).

the respective total outputs from plants having acid-making facilities and from those not having such facilities.

In 1940, the total production of superphosphate with acid purchased from non-fertilizer manufacturers, including all superphosphate made with byproduct and spent acids, amounted to 1,156,160 tons or 25.5 per cent of the total production with acid from all sources; the corresponding figures for 1941 are 1,372,840 tons and 27.2 per cent (Table 17). Likewise, the respective figures for superphosphate produced with acid purchased from fertilizer manufacturers are 369,911 tons (8.2 per cent) and 447,617 tons (8.9 per cent) while those for superphosphate made with acid produced in coexisting plants are 3,001,743 tons (66.3 per cent) and 3,235,-280 tons (64.0 per cent). In the same order, the increases in the 1941 outputs of superphosphate made with acids from different sources, as compared to the productions in 1940, were 18.7, 21.0, and 7.8 per cent.

By far the greater portion of the output of superphosphate in the individual regions, except the Midwest, is made with acid produced in coexisting plants. In the Midwest, however, only 38.0 per cent of the regional output was made with such acid in 1940, and 36.1 per cent in 1941. The corresponding figures for the Middle Atlantic, Southern, and undistributed States (California, Michigan, and New England) are 81.9, 78.4; 65.0, 64.0; and 69.3, 61.3 per cent, respectively. On the other hand, the portion of the Midwest output made with acid purchased from non-fertilizer manufacturers amounted to 52.4 per cent in 1940 and 53.9 per cent in 1941; in no other region did the portion of the output made with such acid exceed 30 per cent in either year, and in the Middle Atlantic States it was only 16.6 and 19.4 per cent in 1940 and 1941, respectively. The portion of the regional output of superphosphate produced with acid purchased from fertilizer manufacturers was highest (11.9 and 12.2 per cent in 1940 and 1941, respectively) in the South and lowest (1.5 and 2.2 per cent) in the Middle Atlantic States.

Byproduct sulphuric acid from copper and zinc smelters was used in the South and Midwest in making 648,418 tons of superphosphate in 1940 and 751,774 tons in 1941, corresponding respectively to 14.3 and 14.9 per cent of the total domestic productions in those years (Table 18). In the South the production of superphosphate with such acid was 390,982 tons in 1940 and 474,695 tons in 1941, or 17.2 and 17.8 per cent of the respective total productions in that region; corresponding figures for the Midwest are 257,436 and 277,079 tons, 37.1 and 37.2 per cent. Of the entire domestic production of superphosphate, 14.3 per cent was made with byproduct acid in 1940 and 14.9 per cent in 1941. In 1941 the production of superphosphate with byproduct acid was 15.9 per cent higher than in 1940, as compared to an increase of 10.9 per cent in the production with acid from all other sources.

As indicated by the figure for 1940 (Table 18), normally a comparatively small quantity of superphosphate is made with spent acid from the manufacture of explosives. The expansion in the production of explosives for military purposes is reflected, at least in part, in the increase (59.4 per cent) in the 1941 production of superphosphate with spent acid

Table 17

Production of Ordinary Superphosphate with Sulphuric Acid Made in Coexisting Plants, Purchased from Fertilizer Manufacturers, and Purchased from Other Than Fertilizer Manufacturers, Respectively, Calendar Years 1940 and 1941

(Includes all grades of ordinary superphosphate and wet-mixed base, expressed as equivalent 16 per cent superphosphate.)

	Superphosphate produced with acid—					
	Made in coexisting plants		Purchased from fertilizer manufacturers		Purchased from other than fertilizer manufacturers[1]	
Region	1940 Short tons	1941 Short tons	1940 Short tons	1941 Short tons	1940 Short tons	1941 Short tons
New England[2]	....	....	....	....	....	....
Middle Atlantic	1,164,459	1,153,416	21,826	31,731	235,755	285,550
Southern	1,473,543	1,706,006	269,268	326,167	524,996	633,798
Midwest[3]	264,031	269,592	66,369	74,189	363,750	401,968
Undistributed[4]	99,710	106,266	12,448	15,530	31,659	51,524
United States	3,001,743	3,235,280	369,911	447,617	1,156,160	1,372,840

[1] Including all superphosphate made with byproduct and spent acids.
[2] Included with undistributed States.
[3] Except Michigan, which is included with undistributed States.
[4] California, Michigan, and new England States (Massachusetts).

from this source. It is believed that the figure (76,485 tons) for the 1941 production is, if anything, too low, because it includes an estimate for the last quarter of the year, a period during which spent acid was beginning to be returned from explosive plants at an increasing rate. The production of superphosphate with spent acid from explosives manufacture will certainly be far greater in 1942.

Table 18

Estimated production of ordinary superphosphate with byproduct and spent sulphuric acids, calendar years 1940 and 1941

(Includes all grades of ordinary superphosphate and wet-mixed base, expressed as equivalent 16 per cent superphosphate.)

Type of acid and nature of manufacturing industry	Production of Superphosphate: Plants 1940 Number	Plants 1941 Number	Quantity 1940 Short tons	Quantity 1941 Short tons
Byproduct—copper and zinc smelters	[1]34	[1]34	[2]648,418	[3]751,774
Spent—explosives	3	9	47,975	76,485
Spent—other industries[4]	7	8	115,725	131,111
Total	44	51	812,118	959,370

[1] 24 in the South and 10 in the Midwest.
[2] Comprising 390,982 tons in the South and 257,436 tons in the Midwest.
[3] Comprising 474,695 tons in the South and 277,079 tons in the Midwest.
[4] Petroleum refining, metal treatment, and manufacture of alcohol, dyes, pigments and other chemicals.

Other sources of spent acids used in the manufacture of superphosphate are the petroleum refining industry, production of pigments, especially titanium compounds, metal refining and treating plants, manufacture of dyes and alcohols, and certain chemical-treatment processes. The production of superphosphate with spent acids from these sources totaled 115,725 tons in 1940 and 131,111 tons in 1941 (Table 18). It appears that in the same years the productions of superphosphate with spent acid from petroleum refineries were equivalent, respectively, to approximately 8,700 and 13,600 tons of 16 per cent material.

Sulphuric Acid Consumed in the Manufacture of Ordinary Superphosphate and Wet-Mixed Base

As shown in Table 19, the estimated quantities of sulphuric acid used for the manufacture of ordinary superphosphate and wet-mixed base in 1940 and 1941 were equivalent, respectively, to 2,089,150 and 2,332,740 tons of 50° Baumé material. These figures are calculated from the productions of superphosphate and wet-mixed base (Table 5) on the assumption that the equivalent of 0.96 ton of 50° Baumé acid was used per ton of phosphate rock, that the shrinkage during the manufacture of the superphosphate or wet-mixed base was 12 per cent, and that the run-of-pile material averaged 19.3 per cent available P_2O_5.

Table 19

Estimated Consumption of Sulphuric Acid in the Manufacture of Ordinary Superphosphate and Wet-mixed Base, Calendar Years 1940 and 1941

(The factor 0.4614, used to convert 16 per cent superphosphate (Table 5) into equivalent 50° Baumé acid, is based on the assumption that the equivalent of 0.96 ton 50° acid was used per ton of phosphate rock, that the shrinkage was 12 per cent, and that the run-of-pile superphosphate averaged 19.3 per cent available P_2O_5.)

Region and State	50° Baumé Sulphuric Acid 1940 Short tons	1941 Short tons
New England[1]	36,550	47,710
Middle Atlantic	656,130	678,580
Maryland	479,060	486,450
New Jersey	102,480	113,110
New York and Pennsylvania	74,590	79,020
Southern	1,046,380	1,230,100
Alabama	107,650	121,930
Arkansas and Texas	31,680	37,980
Florida	80,460	95,620
Georgia	194,300	248,150
Louisiana	56,040	69,240
Mississippi	39,350	38,780
North Carolina	118,070	143,310
South Carolina	126,820	151,900
Tennessee	132,610	159,030
Virginia	159,400	164,160
Midwest[2]	320,280	344,090
Illinois	91,420	103,430
Indiana	45,700	53,770
Michigan[3]	....	....
Ohio	183,160	186,890
Undistributed[4]	29,810	32,260
United States	2,089,150	2,332,740

[1] The consumption was entirely in Massachusetts.
[2] Except Michigan, which is included with undistributed States.
[3] Included with undistributed States.
[4] California and Michigan.

The average equivalent quantity of 50° Baumé acid actually used per ton of phosphate rock appears to average slightly less than 0.96 ton for superphosphate made from Florida pebble but somewhat higher than this figure for material made from Tennessee rock.[4] Although the acid:rock ratio for wet-mixed base is usually, no doubt, much higher than 0.96, the production of this material is very small in comparison with that of ordinary superphosphate. Among other factors, the degree of shrinkage that occurs during

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Increase Asked in Fish Meal Ceiling

A markup of the present differential of $3 per ton over the price ceiling for fish scrap was asked by representatives of more than a hundred grinders and marketers of fish meal in an application to the Office of Price Administrator. Their plea for a larger differential was based upon their inability to operate at a profit on the existing price level because of the relatively high costs of hauling the scrap from the docks, grinding, bagging and marketing it. Their arguments toward this end were made at a recent meeting in Washington called by OPA at which John K. Westburg, OPA's associate price executive, presided, assisted by Charles Kenney.

In response to arguments advanced by several Western fish meal grinders on the score of the high cost of merchandising their product, OPA suggested that they employ a single distributing agency to conduct marketing operations for all of them. This suggestion was opposed by these interests on the ground that its setting up and operation would only add to, instead of lessening, their costs.

After considerable discussion, in which the OPA officials made it clear that they were disinclined to grant the request for a higher price ceiling for fish meal, adjournment was taken. The OPA officials have promised to give the matter further consideration.

Charles Ellis Jr., Heads Mutual Fertilizer

At a recent meeting of the directors of the Mutual Fertilizer Company, of Savannah, Charles Ellis, Jr., was elected president of the Company, succeeding his father, Charles Ellis, who has been made treasurer and chairman of the board. The other officers elected were F. C. Debele, vice-president and sales manager; H. Dana Stevens, secretary; W. C. Connell, assistant treasurer.

Mr. Ellis, Jr., is a graduate of the Sheffield Scientific School, Yale University and was in the engineering department of the Savannah Sugar Refinery. He later joined the staff of the Mutual Company, serving as vice-president and secretary before succeeding his father who had served as head of the company for the past 42 years.

Sulphate of Ammonia Prices Issued

SULPHATE of ammonia—one of the most important agricultural fertilizers—was brought under a specific "dollars and cents" price ceiling on all sales by producers, importers and "primary jobbers," in a new regulation issued on August 17th by Price Administrator Leon Henderson.

The new measure, titled Maximum Price Regulation No. 205, Sulphate of Ammonia Producers, Importers and Primary Jobbers, is effective August 22, 1942 and provides that the lower of the following maximum prices may be charged:

(1) The base price of $28.20 per ton at inland oven plus the transportation charges to buyer's destination from the inland oven nearest the buyer's destination, or

(2) The base price of $29.20 per ton at port, plus the transportation charges to buyer's destination from the port nearest to the buyer's destination.

With the exception that no separate differential is granted in the regulation for "spot sales," these prices are at approximately the same level requested in May, 1941 and again last February of the producers by the Price Administrator. The great majority of producers adhered to this request and this price pattern was frozen by the General Maximum Price Regulation.

Sulphate of ammonia, Mr. Henderson explained, is a by-product of the iron and steel industry, and its importance as a plant food is indicated by the fact that it is the principal source of nitrogen in mixed fertilizers and, as a nitrogen carrier, it has been placed by the War Production Board under strict allocation. Only that which contains 20.5 per cent or more of nitrogen and which is directly applied to the soil as a fertilizer, or used in mixed fertilizers is affected by the regulation.

The primary purpose of the regulation, the Administrator stated, is to establish a uniform ceiling price for all producers, importers and primary jobbers—the latter being defined as a person such as The Barrett Division of Allied Chemical and Dye Corporation who purchases the product from a producer for re-sale to others than consumers.

Since distributional problems are entirely different in the far west than in the eastern section of the country—where the great proportion of the chemical is consumed—shipments to the states of Washington, Oregon, California, Montana, Wyoming, Idaho, Nevada, Utah, Arizona and in the territories of Alaska and Hawaii are exempted from the regulation.

The ceiling prices under the General Maximum Price Regulation were $28.00 per ton at inland ovens and $29.00 per ton at ports, with a dollar extra added for so-called spot sales. It has been customary in the industry to sell under long term contracts, with a relatively small proportion sold under contracts of less than 10 months, these latter sales being termed "spot sales."

Producers originally charged a lower price for shipments under long term contracts, ranging from 10 to 12 months, as such contracts relieved the storage problem of producers. However, because of recent abnormal demand, many purchasers have been willing to pay the higher price for spot shipments. In order to discourage producers from taking advantage of this situation the regulation eliminates the customary differential for spot sales.

However, the basic price pattern established under the General Maximum Price Regulation is not altered by this action. Normally, about 20 per cent of total sales of sulphate of ammonia fall within the spot sale classification; by increasing the base prices to $28.20 and $29.20 per ton, as compared with the former $28.00 and $29.00, producers who adhere to the normal ratio of spot sales will receive the same gross for total sales. In addition, the tendency of producers to increase spot sales to abnormally high levels will be discouraged.

In accordance with industry practice, the maximum prices are established f. o. b. the nearest port or oven to the buyer's destination, depending upon which results in a lower delivered price. Mr. Henderson emphasized that determining of delivered prices on the basis of this principle of equalization is specifically required by the regulation and that it is a violation of the measure for producers to avoid absorbing any part of the cost of transportation by making sales f. o. b. point of production.

In addition, the practice of selling f. o. b. the point of production to buyers who thereupon direct shipments to a destination point requiring equalization, is condemned as an evasion and the seller is required to make every effort to determine the buyer's true destination point.

To permit a producer to estimate accurately the average amount of freight rate cost he will be required to absorb for his total production, the regulation provides that the buyer must pay any additional transportation charges that arise by his changing the point of destination named in the shipping order or contract.

This provision does not apply to shipments diverted by War Production Board allocation orders.

In recognition of the fact that a different method of marketing has been customary in certain mid-western states, the regulation provides that the lowest of either the base price of $29.20 per ton delivered to buyer's destination, or the base price of $28.20 per ton at inland oven, plus the transportation charges to buyer's destination from the inland oven nearest such destination may be charged for shipments to Ohio, Indiana, Michigan, Illinois, Kentucky, Wisconsin, or in the Ohio River section of West Virginia.

The measure provides that for the purpose of determining a producer's maximum price under the Maximum Export Price Regulation, the domestic ceiling price shall be $28.20 per ton, f. o. b. inland producing oven or $29.20 per ton, f. o. b. port oven, except in the case of exports to Puerto Rico. Puerto Rican shipments must be based on a domestic of $29.20 per ton, f. o. b. the port of normal exportation of such material.

The regulation applies only to producers, primary jobbers and importers, for the reason that maximum prices for mixed fertilizer containing sulphate of ammonia, as well as maximum prices for sulphate of ammonia sold to consumers by a fertilizer manufacturer other than a producer, or by a dealer, are already governed by specific schedules (Maximum price Regulations Nos. 135 and 108).

Fertilizer Used on Cotton

An average of 292.9 pounds of fertilizer was used per acre of cotton this year or 7.6 pounds more than used last year. Mississippi, Oklahoma, Texas, and Missouri used less fertilizer per acre of cotton. Because of a slight shift in acreage, 1,525,000 tons of fertilizer were used on cotton, about 1,800 tons less than last year, according to a recent Department of Agriculture release.

COMMERCIAL FERTILIZER USED ON COTTON

State	Acres receiving fertilizer 1941	1942	Fertilizer applied per acre when used 1941	1942	Total Fertilizer used on cotton 1941	1942
	Thousands		Pounds		Tons	
Missouri	96	85	180	155	8,640	6,588
Virginia	36	44	405	450	7,290	9,900
North Carolina	796	852	440	460	175,120	195,960
South Carolina	1,210	1,222	430	435	260,150	265,785
Georgia	1,847	1,811	325	335	300,138	303,342
Florida	65	59	295	305	9,588	8,998
Tennessee	442	453	205	215	45,305	48,698
Alabama	1,719	1,755	330	335	283,635	293,962
Mississippi	1,893	1,722	225	210	212,962	180,810
Arkansas	1,189	1,246	170	175	101,065	109,025
Louisiana	685	655	175	180	59,938	58,950
Oklahoma	35	19	135	125	2,362	1,188
Texas	650	426	175	170	56,875	36,210
All others	47	71	195	180	4,607	6,430
United States	10,710	10,420	285.3	292.9	1,527,675	1,525,846

FERTILIZER MATERIALS MARKET

NEW YORK

Sulphate of Ammonia Prices Announced. Spot Sale Price Eliminated. No Change in Nitrate of Soda or Potash Situation.

Exclusive Correspondence to "The American Fertilizer"

NEW YORK, August 25, 1942.

Sulphate of Ammonia

The price for the new season for sulphate of ammonia has now been announced by OPA, effective as of August 22. The price schedule does not make any provision for spot sales as such, but has taken into consideration that approximately 20 per cent of the sulphate of ammonia sales were spot sales, and price as issued is $28.20 per ton f. o. b. inland oven, or $29.20 per ton f. o. b. Atlantic ports.

Exemption has been made on this price for shipments to the states of Washington, Oregon, California, Montana, Idaho, Nevada, Utah, Arizona and for shipments to Alaska and Hawaii.

Potash

There has been no change in the situation, and deliveries are being made by manufacturers regularly against new contracts.

Nitrate of Soda

There has been no change in the price of this article, but deliveries are still under allocation and only a small proportion of usual supply is being allotted.

BALTIMORE

Prices on Sulphate of Ammonia Issued. Approved List of Grades Published. Few Offerings of Organics on the Market

Exclusive Correspondence to "The American Fertilizer"

BALTIMORE, August 25, 1942.

The outstanding feature in the Fertilizer business during the past two weeks has been the issuance by OPA of new price schedule for sulphate of ammonia.

Organic Ammoniates.—There is practically no business passing and fertilizer tankage, which continues firm in sympathy with the feeding market, is $6.00 per unit of nitrogen, f. o. b. shipping point.

Nitrogenous Material.—There are still no offerings on the market and other fertilizer materials of vegetable origin are also scarce and in short supply.

Sulphate of Ammonia.—New prices on sulphate of ammonia on ten and twelve months contracts have been issued at $28.20 per ton at inland ovens, plus transportation charges to destination from nearest producing point, or $1.00 per ton higher at Baltimore or other approved ports, plus transportation charges to buyers' destination from nearest port. At the same time WPB has listed fertilizer mixtures which are authorized, showing percentage of nitrogen, phosphoric acid and potash content, with a reduction in the percentage of nitrogen in some cases and elimination of nitrogen entirely in others for certain crops.

Nitrate of Soda.—There has been no change in the market, but deliveries are still being allocated by OPA based on last year's deliveries. The nominal price is $33.00 in bulk, ex-warehouse for the Chilean product, and $30.00 in bulk, both per ton of 2,000 lb.

Fish Scrap.—The catch continues small with demand light, due to the spread between the raw material and the finished product being only $3.00 per ton, which dealers contend is inadequate to cover conversion cost.

Superphosphate.—There is no change in the situation and manufacturers continue to quote ceiling price of $9.60 per ton of 2,000 lb., basis 16 per cent for run-of-pile, and $10.10 for flat 16 per cent grade, both in bulk, f. o. b. producers' works, Baltimore.

Bone Meal.—Practically no raw or steamed bone meal is being offered, and at the same time the demand is practically nil.

Potash.—Practically all manufacturers have now covered for their requirements, and deliveries are being made against such contracts.

Bags.—The prospects of having any material quantity available for fertilizer are very remote. In the meanwhile most of the manufacturers are arranging to use paper bags, although there are occasional calls for cotton bags for fertilizers.

CHARLESTON

Organic Materials Scarce. Meeting on Fish Meal Prices. Sulphate of Ammonia Prices

Exclusive Correspondence to "The American Fertilizer"

CHARLESTON, August 24, 1942.

The price on sulphate ammonia has been fixed and is to be sold by the producers at whichever is the lower of the two following prices: $28.20 per ton at inland ovens, or $29.20 per ton at the principal ports.

Nitrogenous.—Sellers of all types of nitrogenous are still refusing to quote.

Blood.—This material is quoted in Chicago at $5.70 to $5.75 per unit of ammonia ($6.93 to $6.99 per unit N).

Fish Meal.—This material is still scarce and a meeting is to be held in Washington on August 24th to determine what prices should be effective.

Cottonseed Meal.—The 8 per cent grade is quoted at $35.00, Memphis; $36.00, Atlanta.

CHICAGO

Few Offerings of Fertilizer Organics with No Futures. Feed Market Slow with New Producers in the Field

Exclusive Correspondence to "The American Fertilizer"

CHICAGO, August 24, 1942.

Trading remains narrow and the fertilizer organics market shows no change. Inquiry continues active, but sellers, most professing a well sold up position, are putting out but few, if any, offerings, and especially no future shipments.

The feed materials market is still a slow affair, as offers fail to come to light. Heretofore, many country producers sold their unground product to mixers, but at present, realizing better prices, these producers are grinding and selling to consumers.

Nominal prices are as follows:

High grade ground fertilizer tankage, $3.85 to $4.00 ($4.68 to $4.86 per unit N) and 10 cents; standard grades crushed feeding tankage, $5.37 per unit ammonia ($6.53 per unit N); blood, $5.75 to $5.80 (6.99 to $7.05 per unit N); dry rendered tankage, $1.21 per unit of protein, Chicago basis.

TENNESSEE PHOSPHATE

Heavy Rains Avert Water Shortage. Phosphate Shipments Active. New Mining and Plant Construction Proceeding

Exclusive Correspondence to "The American Fertilizer"

COLUMBIA, August 23, 1942.

Another week of heavy rainfall brought August up to a record and the past ten days have been more like the last part of September or the first of October. Two points of heaviest downpour centered in Columbia and a few miles from Centerville, in Hickman County. Prospects generally over the TVA watershed do not cause any anticipation of the customary fall water shortage at the various power dams.

Phosphate shipments continue at a high rate to all consuming channels. There is a heavy demand from farmers for ground rock for direct application, especially anxious to get same applied before October 1st, to make the deadline for benefit payments therefrom in the AAA program. The AAA program in Illinois, the only state where grants of aid are allowed on rock phosphate purchased and

distributed by the USDA, have so far taken the full quota provided in the contract all this year.

A plant is being erected on Swan Creek in Hickman County for grinding phosphate rock, parties from Bloomington, Illinois being reported to be behind the operations. The plant is being constructed by Jason Kimbro, who has engaged in phosphate mining for lump rock many years.

The International Minerals & Chemical Corp. has been engaged all summer in developing some of the heavy underground brown rock muck deposits on the large Laverack tract, and have accumulated some three thousand tons of material at the mouth of the mines in developing entries and cross cuts for future mining. Work has been discontinued awaiting future construction of a mining plant when it is more propitious for same.

The TVA plants on the Aiken place and at Godwin, north of Columbia, are rapidly nearing completion and will soon be in regular operation on all grades to be shipped to the furnace plant at Muscle Shoals for making elementary phosphorus for Army and Navy use, and for treble superphosphate for Lease-Lend requirements.

Considerable delay is reported from many sections in securing AAA superphosphate, largely because it is all wanted at once to get in on benefit payments, and distribution is the bottleneck.

The General Order O.D.T. No. 18, effective September 15th, requiring all freight cars to be loaded to maximum load limit, will cause great difficulty and hardship to farmers purchasing ground rock for direct application, except to the large buyers of several hundred tons, who of course are glad to have all each car will hold. The small farmer who can take and pay for only a minimum car, will be out of luck.

Cottonseed Meal Production

The figures for the production of cottonseed products, compiled by the U. S. Bureau of the Census, show that during the crop year from August 1, 1941 to July 31, 1942, the production of cottonseed cake and meal totaled 1,752,663 tons, compared with 1,953,589 tons during the 1940–41 crop year. Shipments during the past year amounted to 1,724,197 tons, as against 1,868,646 tons in 1940–41. Stocks on hand at the mills on July 31,1942 were 192,910 tons, an increase over the 164,444 tons on hand July 31, 1941.

Large Cotton Crop Predicted

The August report of the U. S. Department of Agriculture indicates a 1942 cotton crop of 13,085,000 bales, compared with the 1941 crop of 10,744,000 bales and a ten-year average (1931–40) of 13,109,000 bales. The increases over 1941 were greatest in Texas, Mississippi, Louisiana and Georgia while declines were recorded for Missouri and Tennessee.

THE AGRICULTURAL GOALS

(Continued from page 8)

selves might agree to increase the average plantfood content of their goods and thereby automatically eliminate the prevalence of uneconomic fertilizers with low percentages of plantfood. Such a program, assuming all manufacturers would cooperate, would not eliminate the need for a strong educational appeal among both dealers and farmers to get acceptance. Obviously, unless a very large proportion of the manufacturers, practically all of them in fact, did cooperate it would be ineffective and of little value.

This brings us to the third approach—the control of plantfood content in mixed fertilizers through direct governmental regulation. A number of States already have taken steps in this direction. While the probabilities are that most of the States eventually will pass such laws, and these laws will be amended from time to time so that the minimum average plantfood content will be gradually raised regulation by the States is not likely to move rapidly enough or uniformly enough to cope with the present war emergency.

The alternative that suggests itself is a resort to Federal regulation through the broad authority granted the war agencies to impose restrictions in the interest of the Victory Program. The primary advantage of this approach lies in the opportunity it presents for immediate action.

Whatever course is followed—whether it be one of the three I have just mentioned, or none, or all three—it is obvious that something must be done at once. This is necessary not only to eliminate wasteful peacetime practices but also to conserve limited supplies of essential materials—nitrogen, for example. None of us in government, industry, or elsewhere knows what the nitrogen picture is going to look like six months hence. We know we are going to have about the usual amount of sulphate of ammonia. We know our domestic production of synthetic nitrogen materials is nearly all going into other essential war uses. We know that imports of synthetics are seriously curtailed. What we don't know, even approximately, however, is how much nitrate can be brought in from Chile. Not knowing that, you don't know how much will be available to replace the missing nitrogen in mixed goods and how much will be available for direct application.

There is similar uncertainty in organics. We feel fairly certain that we will have what might be termed the usual supply of regular fertilizer organics—but what about the possible oversupply of seed meals beyond any possible use for feeding purposes? It is possible that expanded livestock and poultry goals and improved livestock rations will require practically all the meals that will be available. It is also possible that our production of seed meals will greatly exceed any likely use as feeds—that there will be an excess quantity of meals amounting to as much as 1,000,000 tons during the coming fertilizer year. Variable factors such as weather and insect infestation are likely to be the deciding factors. We can be sure, however, that if there should be any excess of seed meals over the Nation's requirements for feeds that meal will not be wasted. If it can't be used for feeding—its most essential and profitable use—it will be used to help replace some of the missing nitrogen under our crops.

These wartime problems I have mentioned are necessarily fraught with uncertainties. The difficulties you face are not such as can be solved from a speaker's platform or by fiat from a Government Office or Board or Department. They are essentially your problems as manufacturers and businessmen; and if the Government has intervened, or finds it necessary to intervene further, it is only because the emergencies of war—a new kind of war—require prompt and coordinated action. We hope that with the coming of peace many of these difficulties will have been permanently resolved.

It is part of America's good fortune that in our provisions against the uncertainties of war we can likewise provide against many of the past uncertainties of peace. The shifts the farmer is making in production are as valuable for peace as for war. Likewise the new efficiencies in production and transportation which war is requiring of industry need not be foregone when the war is over. They can become the permanent contribution of total war to total peace.

ANALYSIS OF THE PRODUCTION OF ORDINARY SUPERPHOSPHATE IN THE UNITED STATES IN THE CALENDAR YEARS 1940-1941

(Continued from page 11)

the manufacture of superphosphate depends on the concentration of the acid and the quantity of volatilizable substances in the phosphate rock. The artificial drying of superphosphate, as, for example, in certain methods of producing granular products, has, of course, a considerable effect on the amount of shrinkage. Although these factors may vary considerably among the individual plants, an average shrinkage of 12 per cent is probably fairly representative of the industry as a whole. It is believed that the use of the average factor 0.4614 for the conversion of 16 per cent superphosphate into equivalent quantities of 50° Baumé acid gives results that are approximately correct.

In the extracontinental United States superphosphate is made in only two plants—the one at Honolulu, Territory of Hawaii, operated by the Pacific Guano and Fertilizer Company, and the other at Hato Rey, Puerto Rico, operated by the Puerto Rico Phosphate and Acid Works. Both plants have coexisting facilities for making sulphuric acid. The Hawaiian plant normally uses phosphate rock from Florida and from Makatea Island, French Oceania, while the Puerto Rican plant uses Florida rock exclusively. Both plants use high-grade rock (75–82 per cent B. P. L.), and the run-of-pile superphosphate contains 20.5–23.0 per cent P_2O_5. The total capacity of the two plants to produce superphosphate is less than 50,000 tons of equivalent 16 per cent material annually, and the total storage capacity is less than 15,000 tons. The plants operated at 68 per cent of total capacity in 1940 and at 78 per cent in 1941.

Appendix A

Companies and Plants Actively Engaged in the Manufacture of Ordinary Superphosphate and (or) Wet-mixed Base in the Continental United States and Insular Possessions, as of December 31, 1941

(Does not include companies and plants that did not produce superphosphate and (or) wet-mixed base in 1941, nor a company (Pennsylvania Salt Manufacturing Company, operating a plant at Philadelphia) that ceased production of superphosphate during 1941.)

No.	Name of Company[1] and address of main office	Number of plants operated	Location of plants
1	Acme Fertilizer Co., Wilmington, N. C.	1	Acme, N .C.
2	A. D. Adair & McCarty Bros., Inc.,[2] Atlanta, Ga.	2	East Point, Ga.; Chattanooga, Tenn.
3	Alabama Warehouse Co., Troy, Ala.	1	Troy, Ala.
4	American Agricultural Chemical Co., The, 50 Church Street, New York City	15	Montgomery, Ala.: Pensacola, Pierce, Fla.; timore, Md.; North Weymouth, Mass.; Detroit, Mich.; Carteret, N. J.; Buffalo, N. Y.; Cincinnati, Cleveland, Ohio; Charleston, Columbia, S. C.; Alexandria, Va.
5	Anderson Fertilizer Co., Inc., Anderson, S. C.	1	Anderson, S. C.
6	Arkansas Fertilizer Co., Little Rock, Ark.	1	Little Rock, Ark.
7	Armour Fertilizer Works, Atlanta, Ga.	13	Jacksonville, Fla.; Albany, Atlanta, Columbus, Ga.; Chicago Heights, Ill.; Shrewsbury, La.; Carteret, N. J.; Greensboro, Navassa, N. C.; Cincinnati, Sandusky, Ohio; Nashville, Tenn.; Houston, Texas
8	Baugh & Sons Co.; The Baugh Chemical Co.,[3] Baltimore, Md.	2	Baltimore, Md.; Philadelphia, Pa.
9	Catawba Fertilizer Co., Lancaster, S. C.	1	Lancaster, S. C.
10	Consolidated Rendering Co., Boston, Mass.	1	Lowell, Mass.
11	Contentnea Guano Co., Wilson, N. C.	1	Wilson, N. C.
12	Cotton States Fertilizer Co., Macon, Ga.	1	Macon, Ga.
13	Darling & Co., 4201 S. Ashland Ave., Chicago, Ill.	1	East St. Louis, Ill.
14	Davison Chemical Corp., The, Baltimore, Md.	3	Baltimore, Md.; Columbus, Ohio; Nashville, Tenn.
15	Diamond Fertilizer Co., The; The Michigan Fertilizer Co.,[3] Sandusky, Ohio	2	Lansing, Mich.; Sandusky, Ohio
16	Dixie Guano Co., Laurinburg, N. C.	1	Laurinburg, N. C.
17	Empire State Chemical Co., Athens, Ga.	1	Athens, Ga.
18	Etheredge Guano Co., Augusta, Ga.	1	Augusta, Ga.
19	Farmers' Cotton Oil Co.,[4] Wilson, N. C.	1	Norfolk, Va.
20	Farmers Fertilizer Co., The, Columbus, Ohio	1	Columbus, Ohio

(*Continued on page 24*)

See Page 4

Appendix A (*Continued*)

No.	Name of Company and address of main office	Number of plants operated	Location of plants
21	Federal Chemical Co., Louisville, Ky.	2	Columbus, Ohio; Nashville, Tenn.
22	Fertilizer Mfg. Cooperative, Inc., Baltimore, Md.	1	Baltimore, Md.
23	Georgia Fertilizer Co., Valdosta, Ga.	1	Valdosta, Ga.
24	Gulfport Fertilizer Co., Gulfport, Miss.	1	Gulfport, Miss.
25	Hamm Co., The M., Washington Court House, Ohio.	1	Washington Court House, Ohio
26	Home Guano Co., The, Dothan, Ala.	1	Dothan, Ala.
27	International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago, Ill.	16	Florence, Montgomery, Ala.; Texarkana, Ark.; Americus, Augusta, Columbus, East Point, Tifton, Ga.; Woburn, Mass.; Tupelo, Miss.; Buffalo, N. Y.; Lockland, Ohio; Hartsville, Spartanburg, S. C.; Greeneville, Wales, Tenn.
28	Jackson Fertilizer Co., Jackson, Miss.	1	Jackson, Miss.
29	Kingsbury & Co., Indianapolis, Ind.	1	Indianapolis, Ind.
30	Knoxville Fertilizer Co., Knoxville, Tenn.	1	Knoxville, Tenn.
31	Merchants Fertilizer Co., Charleston, S. C.	1	Charleston, S. C.
32	Meridian Fertilizer Factory, Hattiesburg, Miss.	1	Hattiesburg, Miss.
33	Mutual Fertilizer Co., Savannah, Ga.	1	Savannah, Ga.
34	Pacific Guano & Fertilizer Co., The, Honolulu, T. H.	1	Honolulu, T. H.
35	Pelham Phosphate Co., Pelham, Ga.	1	Pelham, Ga.
36	Planters Fertilizer & Phosphate Co., Charleston, S. C.	1	Charleston, S. C.
37	Puerto Phosphate & Acid Works, Hato Rey, P. R.	1	Hato Rey, P. R.
38	Rauh & Sons Fertilizer Co., E., Indianapolis, Ind.	2	Indianapolis, Ind.; Silica (Sylvania P. O.), Ohio
39	Roanoke Guano Co., Roanoke, Ala.	1	Roanoke, Ala.
40	Robertson Chemical Corp., Norfolk, Va.	1	Norfolk, Va.
41	Royster Guano Co., F. S., Norfolk, Va.	10	Bessemer, Montgomery, Ala.; Macon, Ga.; Indianapolis, Ind.; Baltimore, Md.; Jackson, Miss.; Charlotte, N. C.; Toledo, Ohio; Charleston, S. C.; Norfolk, Va.
42	Shreveport Fertilizer Works, Shreveport, La.	1	Shreveport, La.
43	Smith Agricultural Chem. Co., The, Columbus, Ohio	2	Indianapolis, Ind.; Columbus, Ohio
44	Smith-Douglass Co., Inc., Norfolk, Va.	1	Norfolk, Va.
45	Southern Fertilizer & Chemical Co., Savannah, Ga.	1	Savannah, Ga.
46	South. States Phos. & Fertilizer Co., Savannah, Ga.	1	Savannah, Ga.
47	Standard Chemical Co., The, Troy, Ala.	1	Troy, Ala.
48	Standard Wholesale Phosphate & Acid Works, Inc., Baltimore, Md.	1	Baltimore, Md.
49	Stauffer Chemical Co., San Francisco, Calif.	2	Los Angeles, Stege, Calif.
50	Swift & Co., Fertilizer Works, Union Stock Yards, Chicago, Ill.	7	Albany, Atlanta, La Grange, Ga.: Calumet City, Ill; Harvey, La.; Wilmington, N. C.; Norfolk, Va.
51	Tennessee Corporation,[5] 61 Broadway, New York City	5	Montgomery, Ala.; East Tampa, Fla.; East Point, Ga.; New Albany, Ind.; Lockland, Ohio
52	Thomas & Son Co., I. P., Camden, N. J.	1	Paulsboro, N. J.
53	Tunnel & Company, Inc., F. W., Philadelphia, Pa.	1	Philadelphia, Pa.
54	United Chemical Co., Dallas, Texas	1	Dallas, Texas
55	Virginia-Carolina Chemical Corp., Richmond, Va.	24	Birmingham, Dothan, Mobile, Montgomery, Ala.; Rome, Savannah, Ga.; East St. Louis, Ill.; Fort Wayne, Ind.; Shreveport, La.; Jackson, Miss.; Carteret, N. J.; Charlotte, Durham, Selma, Wadesboro, Wilmington, N. C.; Cincinnati, Ohio; Charleston, Greenville, S. C.; Memphis, Mt. Pleasant, Tenn.; Portsmouth, Lynchburg, Richmond, Va.
56	Wilson & Toomer Fertilizer Co., Jacksonville, Fla.	1	Jacksonville, Fla.

[1] Companies operating under different names but having the same officials are included as one company, as are companies known to be subsidiaries of, or controlled by, another company.

[2] The plant at East Point, Ga., is known as the Furman Fertilizer Works, and that at Chattanooga, Tenn., as the Chickamauga Fertilizer Works.

[3] Affiliated Companies.

[4] The superphosphate plant is operated by the Farmers Guano Co.

[5] The plants at Montgomery, Ala., Tampa, Fla., and East Point, Ga., operate under the respective names, Capital Fertilizer Co.; U. S. Phosphoric Products Division; and Southern Agricultural Chemical Corp.

Appendix B

Location and Type of Plants Actively Engaged in the Manufacture of Ordinary Superphosphate and (or) Wet-mixed Base in the Continental United States and Insular Possessions, as of December 31, 1941

State	City or Town	Number of Plants	Company and Type of Plant[1]
Ala.	Birmingham	1	55, B
	Bessemer	1	41, B
	Dothan	2	26, A; 55, A
	Florence	1	27, B
	Mobile	1	55, A
	Montgomery	5	4, A; 27, B; 41, B; 51, B; 55, B
	Roanoke	1	39, B
	Troy	2	3, B; 47, A
Ark.	Little Rock	1	6, B
	Texarkana	1	27, B
Calif.	Los Angeles	1	49, A
	Stege	1	49, A
Fla.	East Tampa	1	51, A
	Jacksonville	2	7, A; 56, A
	Pensacola	1	4, A
	Pierce	1	4, A
Ga.	Albany	2	7, A; 50, B
	Americus	1	27, B
	Athens	1	17, A
	Atlanta	2	7, A; 50, B
	Augusta	2	18, B; 27, B
	Columbus	2	7, A; 89, A
	East Point	3	2, B; 27, B; 51, B
	La Grange	1	50, B
	Macon	2	12, A; 41, A
	Pelham	1	35, A
	Rome	1	55, A
	Savannah	5	4, A; 33, B; 45, A; 46, A; 55, A
	Tifton	1	27, B
	Valdosta	1	23, A
Ill.	Calumet City	1	50, B
	Chicago Hgts.	1	7, A
	East St. Louis	3	4, B; 13, B; 55, B
Ind.	Fort Wayne	1	55, B
	Indianapolis	4	29, B; 38, B; 41, B; 43, B
	New Albany	1	51, B
La.	Harvey	1	50, A
	Shreveport	2	42, B; 55, A
	Shrewsbury	1	7, A
Md.	Baltimore	6	4, A; 8, A; 14, A; 22, B; 41, A; 48, A
Mass.	Lowell	1	10, B
	N. Weymouth	1	4, A
	Woburn	1	27, B
Mich.	Detroit	1	4, A
	Lansing	1	15, B
Miss.	Gulfport	1	24, A
	Hattiesburg	1	32, B
	Jackson	3	28, A; 41, B; 55, B
	Tupelo	1	27, A
N. J.	Carteret	3	4, A; 7, A; 55, B
	Paulsboro	1	52, B
N. Y.	Buffalo	2	4, A; 27, B
N. C.	Acme	1	1, A
	Charlotte	2	41, B; 55, B
	Durham	1	55, A
	Greensboro	1	7, A
	Lairinburg	1	16, B
	Navassa	1	7, A
	Selma	1	55, A
	Wadesboro	1	55, A
	Wilmington	2	50, A; 55, A
	Wilson	1	11, B
Ohio	Cincinnati	3	4, B; 7, B; 55, A
	Cleveland	1	4, A
	Columbus	4	14, B; 20, A; 21, B; 43, A
	Lockland	2	27, B; 51, B
	Sandusky	2	7, A; 15, B
	Silica (Sylvania P. O.)	1	38, B
	Toledo	1	41, A
	Washington Court House	1	25, B
Pa.	Philadelphia	2	8, B; 53, B
S. C.	Anderson	1	5, A
	Charleston	5	4, A; 31, A; 36, A; 41, A; 55, A
	Columbia	1	4, A
	Greenville	1	55, A
	Hartsville	1	27, B
	Lancaster	1	9, B
	Spartanburg	1	27, B
Tenn.	Chattanooga	1	2, B
	Greeneville	1	27, B
	Knoxville	1	30, B
	Memphis	1	55, A
	Mt. Pleasant	1	55, B
	Nashville	3	7, A; 14, B; 21, B
	Wales	1	27, B
Texas	Dallas	1	54, B
	Houston	1	7, A
Va.	Alexandria	1	4, A
	Lynchburg	1	55, A
	Norfolk	5	19, B; 40, A; 41, A; 44, A; 50, B
	Portsmouth	1	55, A
	Richmond	1	55, A
Hawaii	Honolulu	1	34, A
P. R.	Hato Rey	1	37, A

[1] The numerals identify the companies as listed in Appendix 1, Columns 1 and 2. The letters A and B signify plants respectively having and not having coexisting acid-making facilities.

BUYERS' GUIDE • A CLASSIFIED INDEX TO ALL THE ADVERTISERS IN "THE AMERICAN FERTILIZER"

This list contains representative concerns in the Commercial Fertilizer Industry, Including fertilizer manufacturers, machinery and equipment manufacturers, dealers in and manufacturers of commercial fertilizer materials and supplies, brokers, chemists, etc.
For Alphabetical List of Advertisers, see page 33.

ACID BRICK
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

ACID EGGS
Chemical Construction Corp., New York City.

ACIDULATING UNITS
Chemical Construction Corp., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

AMMO-PHOS
American Cyanamid Co., New York City.

AMMONIA—Anhydrous
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA LIQUOR
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA OXIDATION UNITS
Chemical Construction Corp., New York City.

AMMONIATING EQUIPMENT
Sackett & Sons Co., The A. J., Baltimore, Md.

AMMONIUM NITRATE SOLUTIONS
Barrett Division, The, Allied Chemical & Dye Corp., New York City.

AUTOMATIC ELEVATOR TAKEUPS
Sackett & Sons Co., The A. J., Baltimore, Md.

BABBITT
Sackett & Sons Co., The A. J., Baltimore, Md.

BAGS AND BAGGING—Manufacturers
Bagpak, Inc., New York City.
Bemis Bro. Bag Co., St. Louis, Mo.
St. Regis Paper Co., New York City.

BAGS—Cotton
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS—Paper
Bagpak, Inc., New York City
Bemis Bro. Bag Co., St. Louis, Mo.
St. Regis Paper Co., New York City.

BAGS (Waterproof)—Manufacturers
Bemis Bro. Bag Co., St. Louis, Mo.
St. Regis Paper Co., New York City.

BAGS—Dealers and Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Wellmann, William E., Baltimore, Md.

BAGGING MACHINES—For Filling Sacks
Atlanta Utility Works, East Point, Ga.
Bagpak, Inc., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

BAG PILERS
Link-Belt Company, Philadelphia, Chicago.

BEARINGS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

BELT LACING
Sackett & Sons Co., The A. J., Baltimore, Md.

BELTING—Chain
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

BELTING—Leather, Rubber, Canvas
Sackett & Sons Co., The A. J., Baltimore, Md.

BOILERS—Steam
Atlanta Utility Works, East Point, Ga.

BONE BLACK
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Huber & Company, New York City.

BONE PRODUCTS
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

BORAX AND BORIC ACID
American Potash and Chem. Corp., New York City.
Pacific Coast Borax Co., New York City.

BROKERS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Dickerson Co., The, Philadelphia, Pa.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Keim, Samuel L., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

BUCKETS—Elevator
Link-Belt Company, Philadelphia, Chicago
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

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BUYERS' GUIDE

For an Alphabetical List of all the Advertisers, see page 33

BUCKETS—For Hoists, Cranes, etc., Clam Shell, Orange Peel, Drag Line, Special; Electrically Operated and Multi Power
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.

BURNERS—Sulphur
Chemical Construction Corp., New York City.

BURNERS—Oil
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.

CABLEWAYS
Hayward Company, The, New York City.

CARBONATE OF AMMONIA
American Agricultural Chemical Co., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.

CARS—For Moving Materials
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CARTS—Fertilizer, Standard and Roller Bearing
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

CASTINGS—Acid Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Durirch Co., Inc., The, Dayton, Ohio.

CASTINGS—Iron and Steel
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CEMENT—Acid-Proof
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

CHAIN DRIVES—Silent
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHAINS AND SPROCKETS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHAMBERS—Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

CHEMICAL APPARATUS
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

CHEMICALS
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
Bradley & Baker, New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Huber & Company, New York City.

CHEMICALS—Continued
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Phosphate Mining Co., The, New York City.
Wellmann, William E., Baltimore, Md.

CHEMICAL PLANT CONSTRUCTION
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHEMISTS AND ASSAYERS
Gascoyne & Co., Baltimore, Md.
Shuey & Company, Inc., Savannah, Ga.
Stillwell & Gladding, New York City.
Wiley & Company, Baltimore, Md.

CLUTCHES
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CONCENTRATORS—Sulphuric Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

CONDITIONERS AND FILLERS
American Limestone Co., Knoxville, Tenn.
Dickerson Co., The, Philadelphia, Pa.
Phosphate Mining Co., The, New York City.

CONTACT ACID PLANTS
Chemical Construction Corp., New York City.

COPPER SULPHATE
Tennessee Corporation, Atlanta, Ga.

COTTONSEED PRODUCTS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

CRANES AND DERRICKS
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

CYANAMID
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Jett, Joseph C., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

DENS—Superphosphate
Chemical Construction Corp., New York City.
Stedman's Foundry and Mach. Works, Aurora, Ind.

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DISINTEGRATORS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

DRYERS—Direct Heat
Sackett & Sons Co., The A. J., Baltimore, Md.

DRIVES—Electric
Link-Belt Company, Philadelphia, Chicago.

DUMP CARS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

DUST COLLECTING SYSTEMS
Sackett & Sons Co., The A. J., Baltimore, Md.

ELECTRIC MOTORS AND APPLIANCES
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

ELEVATORS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

ELEVATORS AND CONVEYORS—Portable
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

ENGINEERS—Chemical and Industrial
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

ENGINES—Steam
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

EXCAVATORS AND DREDGES—Drag Line and Cableway
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Link Belt Speeder Corp., Chicago, Ill., and Cedar Rapids, Iowa.

FERTILIZER MANUFACTURERS
American Agricultural Chemical Co., New York City.
American Cyanamid Company, New York City.
Armour Fertilizer Works, Atlanta, Ga.
Farmers Fertilizer Company, Columbus, Ohio.
International Minerals and Chemical Corporation, Chicago, Ill.
Phosphate Mining Co., The, New York City.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

FISH SCRAP AND OIL
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Wellmann, William E., Baltimore, Md.

FOUNDERS AND MACHINISTS
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GARBAGE TANKAGE
Wellmann, William E., Baltimore, Md.

GEARS—Machine Moulded and Cut
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GEARS—Silent
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

GELATINE AND GLUE
American Agricultural Chemical Co., New York City.

GUANO
Baker & Bro., H. J., New York City.

HOISTS—Electric, Floor and Cage Operated, Portable
Hayward Company, The, New York City.

HOPPERS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

IMPORTERS, EXPORTERS
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Wellmann, William E., Baltimore, Md.

IRON SULPHATE
Tennessee Corporation, Atlanta, Ga.

INSECTICIDES
American Agricultural Chemical Co., New York City.

LACING—Belt
Sackett & Sons Co., The A. J., Baltimore, Md.

LIMESTONE
American Agricultural Chemical Co., New York City.
American Limestone Co., Knoxville, Tenn.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
McIver & Son, Alex. M., Charleston, S. C.
Wellmann, William E., Baltimore, Md.

LOADERS—Car and Wagon, for Fertilizers
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Acid Making
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Duriron Co., Inc., The, Dayton, Ohio.
Fairlie, Andrew M., Atlanta, Ga.
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Coal and Ash Handling
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Elevating and Conveying
Atlanta Utility Works, East Point, Ga.
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Grinding and Pulverizing
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

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MACHINERY—Power Transmission
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Pumping
Atlanta Utility Works, East Point, Ga.
Duriron Co., Inc., The, Dayton, Ohio.

MACHINERY—Tankage and Fish Scrap
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MAGNETS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MANGANESE SULPHATE
McIver & Son, Alex. M., Charleston, S. C.
Tennessee Corporation, Atlanta, Ga.

MIXERS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

NITRATE OF SODA
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
Bradley & Baker, New York City.
Chilean Nitrate Sales Corp., New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

NITRATE OVENS AND APPARATUS
Chemical Construction Corp., New York City.

NITROGEN SOLUTIONS
Barrett Division, The, Allied Chemical & Dye Corp., New York City.

NITROGENOUS ORGANIC MATERIAL
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
DuPont de Nemours & Co., Wilmington, Del.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Smith-Rowland Co., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

NOZZLES—Spray
Monarch Mfg. Works, Philadelphia, Pa.

PACKING—For Acid Towers
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

PANS AND POTS
Stedman's Foundry and Mach. Works, Aurora, Ind.

PHOSPHATE MINING PLANTS
Chemical Construction Corp., New York City.

PHOSPHATE ROCK
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Phosphate Mining Co., The, New York City.
Ruhm, H. D., Mount Pleasant, Tenn.
Schmaltz, Jos. H., Chicago, Ill.
Southern Phosphate Corp., Baltimore, Md.
Virginia-Carolina Chemical Corp. (Mining Dept.), Richmond, Va.
Wellmann, William E., Baltimore, Md.

PIPE—Acid Resisting
Duriron Co., Inc., The, Dayton, Ohio.

PIPES—Chemical Stoneware
Chemical Construction Corp., New York City.

PIPES—Wooden
Stedman's Foundry and Mach. Works, Aurora, Ind.

PLANT CONSTRUCTION—Fertilizer and Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

POTASH SALTS—Dealers and Brokers
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

POTASH SALTS—Manufacturers
American Potash and Chem. Corp., New York City.
Potash Co. of America, New York City.
International Minerals & Chemical Corp., Chicago, Ill.
United States Potash Co., New York City.

PULLEYS AND HANGERS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

PUMPS—Acid-Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

PYRITES—Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., New York City.
Wellmann, William E., Baltimore, Md.

QUARTZ
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

RINGS—Sulphuric Acid Tower
Chemical Construction Corp., New York City.

ROUGH AMMONIATES
Bradley & Baker, New York City.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

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SCALES—Including Automatic Bagging
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SCRAPERS—Drag
Hayward Company, The, New York City.

SCREENS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SEPARATORS—Air
Sackett & Sons Co., The A. J., Baltimore, Md.

SEPARATORS—Including Vibrating
Sackett & Sons Co., The A. J., Baltimore, Md.

SEPARATORS—Magnetic
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SHAFTING
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SHOVELS—Power
Link-Belt Company, Philadelphia, Chicago.
Link-Belt Speeder Corporation, Chicago, Ill., and Cedar Rapids, Iowa.
Sackett & Sons Co., The A. J., Baltimore, Md.

SPRAYS—Acid Chambers
Monarch Mfg. Works, Inc., Philadelphia, Pa.

SPROCKET WHEELS (See Chains and Sprockets)

STACKS
Sackett & Sons Co., The A. J., Baltimore, Md.

SULPHATE OF AMMONIA
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Hydrocarbon Products Co., New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

SULPHUR
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Freeport Sulphur Co., New York City.
Texas Gulf Sulphur Co., New York City.

SULPHURIC ACID
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.

SULPHURIC ACID—Continued
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Wellmann, William E., Baltimore, Md.

SUPERPHOSPHATE
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Wellmann, William E., Baltimore, Md.

SUPERPHOSPHATE—Concentrated
Armour Fertilizer Works, Atlanta, Ga.
International Minerals & Chemical Corporation, Chicago, Ill.
Phosphate Mining Co., The, New York City.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

SYPHONS—For Acid
Monarch Mfg. Works, Inc., Philadelphia, Pa.

TALLOW AND GREASE
American Agricultural Chemical Co., New York City.

TANKAGE
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Smith-Rowland, Norfolk, Va.
Wellmann, William E., Baltimore, Md.

TANKAGE—Garbage
Huber & Company, New York City.

TANKS
Sackett & Sons, Co., The A. J., Baltimore, Md.

TILE—Acid-Proof
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

TOWERS—Acid and Absorption
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

UNLOADERS—Car and Boat
Hayward Company, The, New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

UREA
DuPont de Nemours & Co., E. I., Wilmington, Del.

UREA-AMMONIA LIQUOR
DuPont de Nemours & Co., E. I., Wilmington, Del.

VALVES—Acid-Resisting
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

WHEELBARROW (See Carts)

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Tennessee Corporation, Atlanta, Ga.

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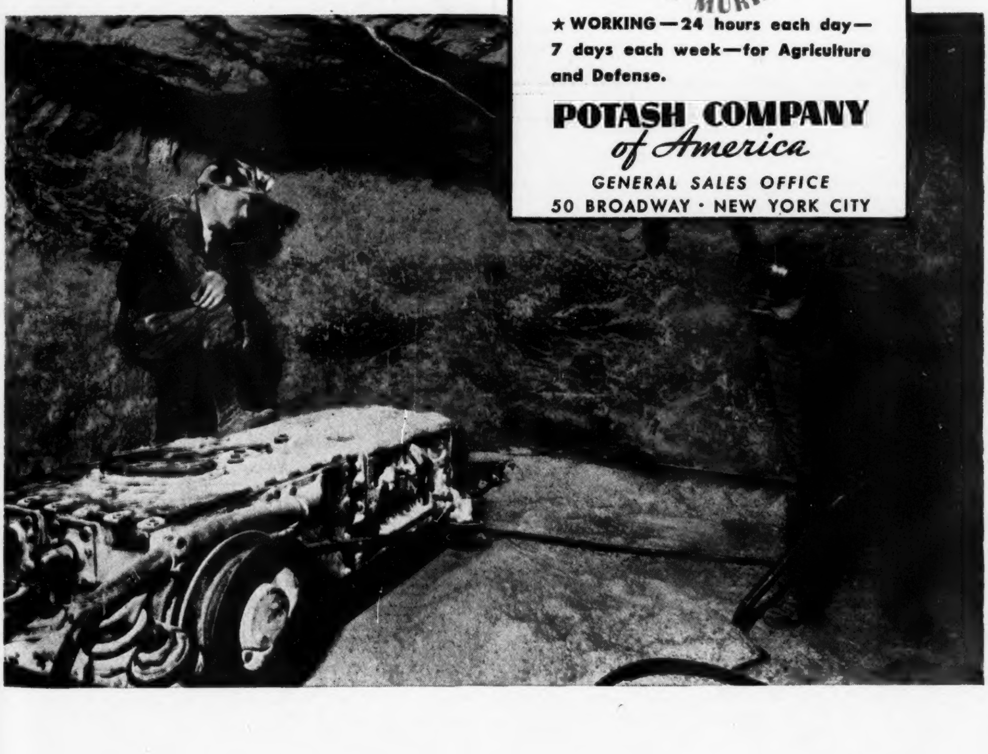

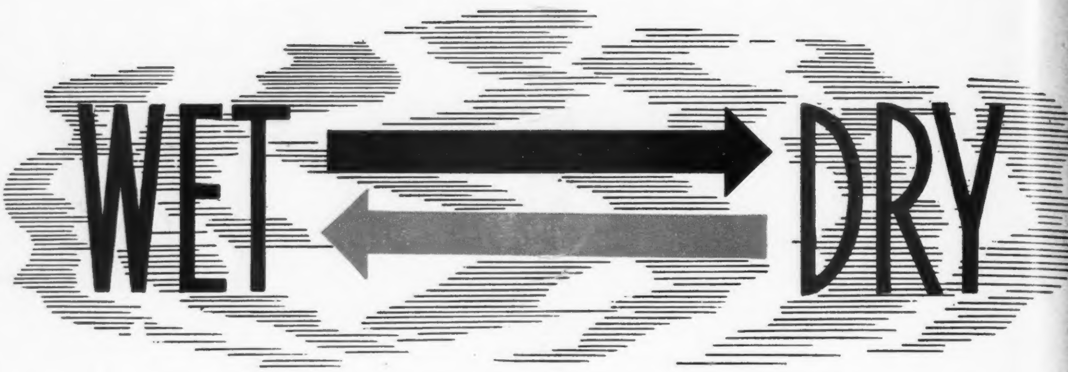
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